Corporate Derivatives as a Manager-Specific Investment

Abstract

This study examines one manager-specific investment, the use of derivatives, and the corresponding market for corporate control. We find firms with large derivatives positions or increases in their unrealized derivatives gains are associated with a significantly lower likelihood of being the target of an acquisition. We further find firms with greater magnitude of derivatives are associated with weaker boards. Consistent with derivatives being used by managers to protect themselves from disciplinary forces, we find the absolute size of firms' unrealized derivatives value is negatively associated with firm value. Finally, firms with decreasing (increasing) idiosyncratic risk as well as increasing (decreasing) absolute value of changes in derivatives realized gains and losses, exhibit a decreasing (increasing) likelihood of takeovers. In summary, the findings are consistent with derivatives being an example of a manager-specific investment (Shleifer and Vishny (1989)) that is successful at entrenching management.

Keywords: Corporate derivatives, manager-specific investment, corporate control, governance

JEL classification: G30; G32; G34

Corporate Derivatives as a Manager-Specific Investment

1.0 Introduction

Shleifer and Vishny (1989) argue that by making manager-specific investments managers can entrench themselves from various forms of market discipline, such as the market for corporate control. When managers invest in projects that are unique to their knowledge set replacing them can be costly. The key to the degree of entrenchment is the specificity of the investment to the skill or knowledge of the manager. When potential replacement managers know little of the investment it is less likely they will be replaced. Corporate takeovers represent one market mechanism for replacing poor performing or entrenched managers (Jensen and Ruback (1983)), however, when acquiring firms are less knowledgeable of manager-specific investment it can increase their potential cost of acquisition. Derivatives represent one type of manager-specific investment that can be difficult to evaluate by others and thus creates an opportunity for managers to protect themselves from unwanted takeovers and blunt the constraining effects of the market for corporate control. The purpose of this study is to examine this theory by analyzing this unique manager-specific investment, the use of derivatives, and the corresponding threat of a takeover.

Financial derivatives use is very widespread, even after the financial crisis. According to the Bank of International Settlements, the over-the-counter derivatives notional amount cleared $700 trillion for the first time in June of 2011 and then again in June 2013. As of December 2015, the over-the-counter notional amount was close to $500 trillion. Today, a significant number of firms routinely manage a variety of market risks with derivatives instruments. Further, in a small end-user survey of 334 end-users released in 2015, in response to the question, “How

important are derivatives to your firm's risk management strategy?" 90% responded either "Important" or "Very Important".

Whether corporations use derivatives for hedging risk or for increasing risk through speculation is not clear in the academic literature. For example, Hentschel and Kothari (2001) find no evidence of firms with large derivatives programs being associated with greater firm risk, which is consistent with corporations using derivatives for hedging purposes. Conversely, Geczy, Minton and Schrand (2007) find evidence in survey responses that indicates some firms use their derivatives programs for speculation, particularly those with weaker governance. Further consistent with the latter view, anecdotal evidence suggests that derivatives have been used in many inappropriate ways.[1] Therefore, corporate derivatives use is often viewed with suspicion (Easterbrook (2002)). The opacity surrounding derivative use makes these instruments very managerial specific and therefore very challenging for outsiders to evaluate.

For example, in the Berkshire Hathaway Inc. 2002 Annual Report, Warren Buffett, Chairman and CEO, reports his views on derivatives (along with Charlie Munger, Vice Chairman). "We view them [derivatives] as time bombs, both for the parties that deal in them and the economic system." (page 13) Mr. Buffett continues to share his views on derivatives as they relate to an insurance company acquisition.

> *"When we purchased Gen Re, it came with General Re Securities, a derivatives dealer that Charlie and I didn't want, judging it to be dangerous. We failed in our attempts to sell the operation, however, and are now terminating it. But closing down a derivatives business is easier said than done. It will be a great many years before we are totally out of this operation (though we reduce our exposure daily). ... [Valuation] (e)rrors will usually be honest, reflecting only the human tendency to take an optimistic view of one's commitments. But the parties to derivatives also have enormous incentives to cheat in accounting for them. ... I can assure you that the marking errors in the derivatives business have not been symmetrical. Almost invariably, they have favored either the trader who was eyeing a multi-million dollar bonus or the CEO who wanted to*

[1]There are many well-documented lists of derivatives-related losses. See, for example, http://en.wikipedia.org/wiki/List_of_trading_losses (accessed on September 14, 2012).

> *report impressive 'earning' (or both). The bonuses were paid, and the CEO profited from his options. Only much later did shareholders learn that the reported earnings were a sham. ... In our view, however, derivatives are financial weapons of mass destruction, carrying dangers that, while now latent, are potentially lethal."* (pages 13 – 15)

Interestingly, according to the 2011 annual report, Berkshire Hathaway Inc. had approximately $60 billion notional amount of derivatives outstanding nine years after expressing this distaste for derivatives. This represents one anecdotal example of the difficulty that large derivative positions can present for potential acquirers.

In this paper, we explore empirically the relationship between financial derivatives use and corporate governance. Specifically, this paper makes four significant contributions to the literature. First, we provide empirical evidence on the relationship between financial derivatives use and the market for corporate control. For example, firms with larger derivatives positions are associated with a lower likelihood of being the target of an acquisition. This is consistent with possible acquirers being reluctant to purchase a firm with a potentially large "time bomb" that is difficult to value and can be difficult to remove once acquired. Conversely, when firms experience a large drop in their derivatives position their likelihood of being targeted increases, as this component of uncertainty is reduced for potential buyers of the firm. Results are robust to different matched-pairs analysis.

Second, we explore the empirical determinants of corporate derivatives use. We document that, on average, the absolute value of firms' derivatives position is positively associated with firm size and negatively associated with the percentage of independent directors on the board. Thus, large firms with weaker internal monitoring from independent directors are more likely to have a larger derivatives position. These findings exacerbate the concerns expressed by Buffett because they further suggest that the firms holding a large derivatives position are also less constrained by stringent board monitoring. Furthermore, we also find a

positive association between the E-Index of a firm and the size of its derivative positions. Thus, when firms employ more of the anti-takeover provisions in the E-Index they are also more likely to employ larger derivative positions. While the anti-takeover provisions in the E-Index often require board approval for adopting, managers can more easily increase their derivative positions in an effort to further insulate themselves from the market for corporate control. On the other hand, firms with more business segments and thus less likely to be a target of an acquisition, have lower derivative positions on average. These results are consistent with large derivative positions being an effective deterrent to take-overs.

Third, using Tobin's Q as a measure of firm market value, we find a negative relation between firm value and derivatives use. One potential explanation for this finding is that large unrealized gains or increases in unrealized gains [2] can reflect managerial hubris, which shareholders view with concern, similar to that of Mr. Buffett. Furthermore, if managers have the freedom to use derivatives as an avenue to inflate earnings, as suggested in Mr. Buffett's comments, it reflects poorly on the board of directors and can signal greater managerial entrenchment. Weak monitoring can have long-term implications for shareholders, which is reflected in a lower market valuation of the firm. Conversely, a large decrease in a firm's derivatives position removes this uncertainty for shareholders and thus corresponds to higher valuations. Thus, on average, derivatives activity by non-financial firms is associated with lower firm valuations consistent with their opacity and potential for being reflective of managerial hubris rather than value enhancing tactics. Thus, these findings reveal another avenue by which entrenched managers can increase the agency costs of shareholders. The net effect of the greater manager entrenchment and ambiguous value of the potentially large derivatives position reveals

[2] We use two measures of derivatives usage. First, we use the unrealized gain/loss from all of the firm's outstanding derivative transactions. Second, we use the realized derivative gains/losses that are included in the firm's total comprehensive income.

evidence that the derivatives position can be one example of manager-specific investment described by Shleifer and Vishny (1989) that can serve to entrench managers, increase agency costs and ultimately reduce shareholder wealth.

Finally, to better separate firms that use derivatives speculatively from those using derivatives for valuable hedging, we compare changes in idiosyncratic risk with the absolute value of changes in derivatives realized gains and losses as a percentage of sales. We find firms with decreasing idiosyncratic risk as well as increasing absolute value of changes in derivatives realized gains and losses as a percentage of sales, exhibit a significantly lower likelihood of being taken over. That is, firms with low non-compensated risk, perhaps due to managing it with financial derivatives, are less likely to be taken over. On the other hand, we find firms with increasing idiosyncratic risk and decreasing absolute value of changes in derivatives realized gains and losses as a percentage of sales, exhibit an increasing likelihood of takeovers. This suggests that these firms may be neglecting to appropriately manage risk or using derivatives for speculative purposes. In sum, firms with increasing non-compensated risk that do not appear to be managing it with financial derivatives are more likely to be taken over.

The remainder of this paper is organized as follows: Section 2 identifies the sample data and provides descriptive statistics. Section 3 explores the relationship between firm derivatives position and the market for corporate control. Section 4 examines the empirical determinants of corporate derivatives use. Section 5 documents the relationship between firm value, measured by Tobin's Q, and derivatives use. Section 6 explores the relationship between firm idiosyncratic risk and derivatives use searching for evidence of risk management. Section 7 provides sensitivity analysis focused on matched-sample analysis to examine these associations deeper. Section 8 provides a summary.

2.0 Sample and descriptive statistics

The primary data source for our analysis is ExecuComp, which covers the S&P 1500 firms. More specifically, since our primary data on derivatives are available only after 2000, our sample begins in 2001 and extends through 2014. We exclude financial firms, which likely engage in greater derivatives activity. We also incorporate board data from the Risk Metrics database. Firm accounting information is obtained from Compustat. Merger and Acquisition data are from Thomson SDC database.

The two primary measures of firm derivatives usage are the unrealized gain/loss on derivative transactions and, when available, the realized gain/loss from derivatives transactions included in comprehensive income. We scale both of these measures by the firm's total sales to normalize them relative to firm size.

Table I reports the summary statistics for these key variables along with other firm and board characteristics. Only 45% of the firm-year observations include reported derivatives information. Of those reporting, the mean unrealized value is a loss of $11.289 million. Although, this is small relative to the sales of the average firm in the sample, it can represent a significant derivatives position. A large derivatives position may have very small mark-to-market values or annual cash flow implications. The notional amount outstanding would provide more information, but it is not available at this time. Even if the notional amount outstanding was available for a particular firm, it still is not sufficient information to have a clear understanding of the related firm risks. The mean derivatives gain or loss among firms with reporting derivatives income is $0.036 million. Even though these values are now disclosed in the firm's financial statements it is difficult, if not impossible, for agents outside the firm to ascertain the

actual fair market value of these derivatives contracts and therefore it can be difficult to determine whether the derivatives position reflect wise management or executive overconfidence.

Table I also reveals that firms reporting derivatives positions are significantly different from other firms in the sample in several dimensions. Firms reporting derivatives transactions are larger in terms of both total assets and total sales. They are also older and have more business segments. Thus, firms with derivatives transactions can be more difficult to value given their larger size and multiple business segments. In addition, firms with derivatives positions have lower levels of Research and Development (R&D) expenditure, consistent with lower levels of innovation in these firms. Given the low growth opportunities, one non-hedging motivation for firms with derivatives positions is to create value by strategically trading derivatives positions, which may or may not be their primary skill set and therefore may not be in the interest of shareholders.

Firms with derivatives activity exhibit different governance characteristics. They have larger boards as well as a greater percentage of independent directors. Thus, there is some evidence that firms with derivatives positions have strong oversight, specifically greater board independence. On the other hand, we also find other characteristics consistent with weaker governance. For example, firms with derivatives activity are more likely to have a busy board, defined as a majority of the independent directors having three or more directorships. As busy boards are more likely distracted due to multiple commitments, they are less likely to monitor diligently (Fich and Shivdasani (2006) and Perry and Peyer (2005)). Additionally, the Chief Executive Officer (CEO) is also more likely to be the chairman of the board of firms with

derivatives positions. Thus, management still has a lot of influence over the board through the CEO being the chair.

Finally, while hedging programs can facilitate value creation, derivatives positions are typically not intended to directly increase the long-term value of the firm. We find that Tobin's Q, a proxy for firm value, is significantly lower in firms with derivatives positions. Though these are only univariate results, the distinct differences in firms with and without derivatives positions suggest that derivatives could be used for more than hedging and could potentially be detrimental if they reveal an arena for managers to engage in more opaque activities that are difficult to monitor and evaluate by someone other than the firm's managers.

Insert Table I

Table II reports the mean and total value of the unrealized derivatives positions for the 10 Fama-French defined industries. Interestingly, only two industries have a positive mean unrealized derivatives position, Consumer Durables and Wholesale/Retail. In absolute terms, Manufacturing, Utilities and Other (which includes transportation and finance), have the largest value in unrealized derivatives positions. These industries also likely have reasons to hedge for fluctuations in fuel and energy prices.

Insert Table II

3.0 Derivatives positions and the market for corporate control

The use of derivatives to hedge against risk exposure can be valuable for managers. Large derivative unrealized gains and losses may be offsetting large firm-related losses and gains. Alternatively, large unrealized gains or losses may reflect excessive use of derivatives, perhaps beyond that required for hedging purposes and can therefore provide additional insight

into managerial skill. Excessive derivatives use can thus represent managerial hubris, which is of interest to shareholders. Large unrealized gains can reflect managers using greater knowledge of their business to create value through derivatives trading. Alternatively, large losses can reflect manager's misunderstanding of the markets in which they operate and trade, revealing lower skill levels.

Although the value of the underlying position is difficult to determine, the reported gains and losses provide insight into their effectiveness and another element of managerial skill. If large derivatives gains and losses are reflective of managerial talent and their degree of alignment with shareholders, they are likely important determinants in whether the firm is the target of an acquisition. The external market for corporate control is an important disciplinary force acting on managers. If large derivatives losses reflect poor manager skills they are expected to be associated with a greater likelihood of the firm being the target of an acquisition. Conversely, large derivatives gains are likely to be associated with a lower likelihood of the firm being the target of an acquisition. Large gains can reduce the likelihood of a firm being a target for two reasons. First, successful derivatives strategies can reflect greater managerial skill that reduces the attractiveness as a target due to poor or entrenched management (Jensen and Ruback (1983)). Second, large derivatives positions are a source of unknown potential liability that can deter potential acquirers due to hidden costs (see Buffett's comments above) and can be difficult to value or unwind by those other than the managers who established them (Shleifer and Vishny (1989)).

After separating firms into terciles based upon a measure of their derivative use, we examine the proportion of firms that are targeted in each tercile. We find that 14.16 percent of firms with the highest derivative use are targeted, 16.98 percent are targeted from the middle

tercile, and 18.09 percent of the lowest derivative use firms are targeted. The difference in proportions between the top and bottom tercile is statistically significant ($p<0.01$). Initial evidence is consistent with high derivative use firms being less attractive targets of an acquisition.

Table III examines this hypothesis by examining the likelihood of firms being the target of an acquisition during our sample period after controlling for other firm characteristics that are associated with the likelihood of a firm being an acquisition target. The dependent variable is one if the firm is the target of an acquisition in a given year and zero otherwise. All models include robust standard errors clustered by firm to account for serial correlation. The key explanatory variables are the derivatives unrealized gains (losses) and the derivatives income gains (losses) scaled by total sales and industry adjusted with the 49 Fama-French industry median. We use the industry adjusted measure to account for the varying use of derivatives across industries.

In model 1 the coefficient estimate on the unrealized derivatives value scaled by total sales is negative and significant. In model 2, we use the first difference of the derivatives unrealized gains and losses and find a similar result. The results in models 1 and 2 indicate that large derivatives gains or increases in derivatives gains are associated with a lower likelihood of the firm being the target of an acquisition in the year. Conversely, firms experiencing derivatives losses are associated with a greater likelihood of being the target of an acquisition. These findings are consistent with derivatives being an important component in determining a firm's attractiveness in the market for corporate control.

In model 3 we consider the realized derivatives income measure of derivatives activity and find similar results. When firm management experiences a gain recorded as derivatives income they are less likely to be targeted, but when they experience a loss recorded as

derivatives loss they are more likely to be targeted particularly if the derivatives loss was not related to hedging. The other controls reveal that firms with recent poor stock performance, low leverage, and better operating performance are more likely to be the target of an acquisition. Also, greater merger and acquisition (M&A) activity within the industry increases the likelihood that a firm is targeted.

If derivatives positions represent a significant component of firm value then potential bidders may have reason to think twice about making an acquisition attempt. First, it can be difficult to truly value the derivatives positions without knowing the details of the contracts. Second, derivatives positions can dramatically change in value based on the contract and the performance of the underlying assets. Thus, potential bidders must evaluate the risk associated with purchasing a firm that could be worth significantly less once the derivatives positions are unwound. This uncertainty associated with excessive derivatives positions can deter many potential buyers. To further examine this issue, we study the likelihood of the acquisition bids for targeted firms being subsequently withdrawn. Due diligence is a critical part of any M&A transaction. Once a bidder initiates a non-hostile acquisition they can work with the target firm to negotiate a final bid and better evaluate the firm before consummating the merger. It is possible that during this period the acquiring firm may obtain information that leads it to reevaluate its bid. If the information is negative, it may choose to withdraw the bid.

Model 4 reports results of a logit regression on the sample of firms targeted by a bidder. It examines the likelihood that the bidding firm withdraws its bid. The coefficient estimate on the change in unrealized derivatives value is positive and significant. This indicates that target firms with large derivatives positions are more likely to have acquisition attempts withdrawn once they have been targeted. One potential reason for a bidder to withdraw their bid is that they realize the

difficulty in valuing the derivatives position. Additionally, increased uncertainty and the potential for large losses could make it too costly for them to pursue the acquisition. Finally, lack of managerial expertise to continue or unwind the derivatives position could also be a deterrent.

Interestingly, we also included an indicator variable equal to one if the acquiring firm had previous experience using derivatives. For example, if the acquiring firm is already engaged in derivative use, they are less likely to be deterred from completing the acquisition due to inexperience with derivatives. As expected we find that experience with derivatives decreases the likelihood the acquirer withdraws its takeover bid.

As described in more detail below, Bebchuk, Cohen and Farrell (2009) develop an entrenchment index (E-Index) comprised of anti-takeover provisions. Given that anti-takeover provisions also are possibly correlated with the size of a firm's derivative position and the prospect of a takeover, we include the E-Index as a control variable in all four regressions in Table 3. Data to calculate the E-Index is available for approximately 75 percent of the observations. We present results in Panel B for the observations that have data to calculate the E-Index. Results are quantitatively and qualitatively similar after including it as a control variable.

Insert Table III

In untabulated analysis, we separate the sample into pre- and post- financial crisis and examine the periods separately. Results are quantitatively and qualitatively similar for all four models with the following exceptions. In model 2 of the pre-crisis period (2001-2005), the coefficient estimate on the derivatives measure is negative but not significant ($p = 0.113$). In model 1 of the post-crisis period (2010-2014) the coefficient estimate on the derivatives measure is negative but not significant ($p = 0.645$).

In summary, firms with large positive derivatives positions are less likely to be targeted in general, but if they are targeted, the uncertainty associated with the value of their derivatives positions makes it more likely that the acquisition is subsequently withdrawn. The findings have important implications for analysis of merger and acquisition decisions. While the findings thus far demonstrate that large derivatives positions can deter takeover attempts, it is not clear whether this deterrence is due to superior managerial skills (unrelated to derivatives) increasing firm value and thus deterring discipline from the market for corporate control. Alternatively, the deterrence could be aversion to acquiring firm risk associated with unknown stakes in large derivatives positions. If the latter is the case, large derivatives positions could indeed represent an important manager-specific investment that can therefore reflect entrenched managers. Moreover, if this is the case then the opacity of their nature makes the market for corporate control less effective in constraining managerial entrenchment. The next two sections address these two possibilities further.

4.0 Determinants of derivatives positions

To further examine the characteristics of firms with derivatives positions, we analyze the factors associated with the absolute value of the derivatives position. Whether the firm reports unrealized gains or losses is not critical as we are interested in the information revealed in the industry adjusted size of the positions reported. Table IV reports results of OLS regressions of the firm's derivatives use on firm characteristics and/or the strength of internal monitoring of management. The dependent variable is the absolute value of the firms unrealized derivatives gains (losses) in model 1 and realized gains (losses) in model 2. All models include industry

fixed effects and robust standard errors clustered by firm. Results are consistent in both models and thus we discuss them simultaneously.

Larger firms are associated with larger derivatives positions. This is perhaps due to the inherent barriers to derivatives use, such as qualified accounting staff, good credit rating, and significant collateral requirements. Thus, not all firms have the internal expertise for their managers' to engage in large-scale derivatives trading. Boards with fewer independent directors are associated with larger derivatives positions. Thus, stronger internal monitoring by the board of directors is associated with a significantly smaller magnitude of the firm's derivatives positions. This is consistent with tighter internal constraints on managers to limit their use of derivatives and with the survey results in Geczy, Minton and Schrand (2007) who find that firms indicating speculative motives for their derivatives also report a greater use of internal controls to monitor trading activity. Furthermore, because larger firms provide greater reputation benefits for directors (Masulis and Mobbs (2014)), these directors are likely more diligent in their monitoring of management and less willing to support activities or practices that are difficult to monitor, such as large derivatives positions.

Board size and CEO/Chair duality are not significantly related to the size of the firm's derivatives positions. Bebchuk, Cohen and Ferrell (2009) construct an entrenchment index (E-Index) comprised of the six strongest anti-takeover provisions from the Gompers, Ishii and Metrick (2003) Governance Index, which are classified boards, golden parachutes, limitations on bylaw and charter amendments, supermajority voting and poison pills. We document that the E-Index is positively associated with derivatives positions, consistent with derivatives use associated with entrenchment behavior. One important difference between the use of derivatives for takeover deterrence and these provisions is that these provisions often require board approval,

whereas managers can alter their derivative positions perhaps without the board even knowing. Thus, it is potentially a more obscure method of deterring unwanted takeovers.

We also find evidence that firms with greater leverage are associated with greater absolute derivatives positions. This is consistent with the idea that the need for quality financial risk management is directly related to leverage. Finally, we find evidence that firms with more business segments are negatively associated with derivatives positions. This is consistent with these firms already being diversified through their multiple business segments and thus having less of a need to hedge risks through the use of derivatives.

Insert Table IV

Pre- and post-crisis analysis yields similar results. Larger firms are associated with larger derivatives positions in both subperiods and the measure is significant. Differences from the overall sample are as follows. Post-crisis, boards with fewer independent directors are associated with larger derivatives positions, but it is not significant. Pre-crisis, the E-Index is positively associated with derivatives positions, but is also not significant.

The use of derivatives to hedge risk exposures should be particularly valuable if the risk is idiosyncratic. That is, shareholders will benefit when managers reduce non-compensated, unsystematic risk to shareholders. For example, hedging idiosyncratic risk can reduce costs associated with financial distress. By reducing the volatility of cash flows the firm can decrease its expected bankruptcy costs as well as its probability of distress, which leads to reduced costs of default as firms are less likely to trigger debt covenants. This is especially the case for firms with higher levels of debt. Thus higher leveraged firms can benefit more from hedging, consistent with results in Table IV. Hedging idiosyncratic risk can also add value by reducing the firm's required rate of return.

In summary, the evidence in Table IV is consistent with certain firm characteristics being associated with larger derivatives positions. One interesting finding, however, is the link between board monitoring, as measured by the percentage of independent directors, and the magnitude of the firm's derivatives positions. Thus, there is evidence of an association between the firm's derivatives practices and its governance. If greater use of derivatives is associated with weaker governance, whether due to reduced discipline from the market for corporate control or from weaker internal monitoring, there should be valuation implications for shareholders.

5.0 Firm value

The evidence thus far suggests that firms with larger derivatives positions are associated with weaker monitoring, which can result in entrenched managers and derivatives positions that are difficult to value. Furthermore, on average, these difficult-to-value derivatives positions are associated with unrealized losses rather than gains. Do these positions reflect greater managerial hubris?

We attempt to provide insight into this question by examining correlations with derivatives positions and firm value. We measure firm value by the natural logarithm of an approximation of Tobin's Q, which is measured as total book assets minus book equity plus the market value of equity all scaled by total book assets. We also include controls used in other similar studies (for example, Coles Daniel and Naveen (2008), Anderson and Reeb (2003), Fich and Shivdasani (2006), and Masulis and Mobbs (2011)). All models also include robust standard errors clustered by firm.

Table V Model 1 reveals a negative and significant relation between the industry adjusted derivatives positions and Tobin's Q. Model 2 reveals a negative and insignificant relation

between the change in industry adjusted unrealized derivatives value and Tobin's Q. These results are consistent with greater derivatives positions or increases in derivatives positions being reflective of managerial hubris, which leads to lower firm value. Conversely, unrealized losses or decreases in unrealized losses are associated with increases in firm value. This is consistent with unrealized losses reflecting partial hedging. For example, a firm that experiences losses from their derivatives positions, but is only 40 percent hedged, will have experienced significant gains that were not completely offset. Model 3 documents insignificant results when using the derivatives income measure while Model 4 documents marginal significance consistent with the result in Model 1. The net effect of the greater manager entrenchment and ambiguous value of the potentially large positions reveals some evidence that these positions are associated with lower firm value and reduced shareholder wealth. Thus, this evidence suggests the previous findings of reduced exposure to discipline from the market for corporate control is more likely due to reluctance of potential acquirers due to the uncertainty of the large derivatives positions rather than skilled risk management.

Insert Table V

In unreported analysis, we also examined the relationship between the firm's derivatives position and CEO compensation. We find no evidence of a significant association, which suggest CEOs are not necessarily using derivatives trading to bolster earnings. This does not mean, however, that the managers do not receive other benefits from their derivatives practices. Specifically, the reduced monitoring from the external market and from their boards suggests these managers face fewer constraints and have the potential to extract other pecuniary benefits from the firm. One such benefit is greater job security through the reduced threat of losing their job by being acquired by another firm.

Pre-crisis subperiod results are the same sign and stronger significance at traditional levels for the derivatives coefficients in Models 1, 2 and 3. Model 4 derivatives coefficient is negative, but not significant. Post-crisis subperiod results have a positive sign for the derivatives coefficients, but are not significant. Thus, perhaps post-crisis derivatives use is not having the same negative impact on firm value.

Although the evidence in this section suggests lower firm values result from greater derivatives use, perhaps there remains a risk management motivation. We explore this possibility next.

6.0 Risk Management

The evidence presented above suggests that the proportion of firms that are targeted decreases with increased derivatives use. A firm with decreasing derivative activity is, all else equal, easier to evaluate as a target. In Table III, we document multivariate evidence consistent with this finding. However, up to this point, we have treated derivative use as homogenous. We recognize that derivatives can be used for either hedging or speculative purposes. As discussed above, proper hedging would reduce firm risk and in particular, idiosyncratic risk. One direct benefit would be lower financial distress costs. Reductions of idiosyncratic risk also may create market value through reduced taxes. For example, increasing marginal tax rates and limits on the use of tax-loss carryforwards impose higher effective rates of taxation on higher levels of reported earnings and provide lower tax rebates on larger losses. Because of the convexity of the tax code, firms can increase value by reducing fluctuations in taxable income and therefore increasing cash flow over time.

While derivatives use may represent a manager-specific investment, we have also shown evidence that acquiring firms with some level of derivative expertise, are less likely to withdraw takeover bids. Thus, acquiring firms with derivative expertise may seek to add firm value through implementing improved hedging strategies.

For example, a firm with derivative use and increasing idiosyncratic risk suggests that management is either poorly skilled at derivative use or using derivatives to deter any unwanted takeover attempts, thus entrenching themselves at shareholders' expense. These firms could be sought after as takeover targets as new skilled managers could implement quality derivatives-based risk management strategies to lower the idiosyncratic risk and hence raise the value of the target firm.

On the other hand, a firm with increasing derivatives use and concurrent decreasing idiosyncratic risk is consistent with management implementing an appropriate hedging strategy. These firms are the least likely to be targeted as even acquirers with derivatives expertise may not be able to add firm value by implementing a different hedging strategy. Thus, in this section, we seek to examine evidence related to derivatives use and idiosyncratic risk.

We explore the relationship between changes in idiosyncratic risk and the absolute value of changes in derivatives realized gains and losses as a percentage of sales. We calculate idiosyncratic risk by regressing the firm's weekly returns on the weekly Fama-French three-factor model for each individual firm year. The idiosyncratic risk is defined as the square root of the unexplained variance (Hou and Moskowitz (2005); Park and Vrettos (2015)). Finally, the observations were split into terciles by the change in idiosyncratic risk and by the absolute value of the change in realized derivative gains and losses. The middle tercile of both measures was eliminated. Thus, we have with a 2 by 2 matrix of firms from the highest of lowest terciles of

changes in idiosyncratic risk and derivative use, i.e. the highest (lowest) tercile of idiosyncratic risk represents are firm with the largest increases (decreases) in risk and the highest (lowest) tercile of derivative use represents the largest (smallest) change in derivatives position.

Table VI reports the results. We expect a firm is more likely to be targeted if they experienced the largest increase in idiosyncratic risk and the smallest change in derivative use as this provides an opportunity of incoming management to initiate a proper hedging strategy and create firm value (19.6 percent of the firms in this quadrant were targeted). Further, management is likely speculating if they experienced the largest increase in both idiosyncratic risk and derivative use (13.6 percent targeted). This quadrant represents firms that are likely using derivatives for speculation and for which derivative use is an effective takeover deterrent. Management is likely hedging if they experienced the largest decrease in idiosyncratic risk and the largest change in derivative use (12.2 percent targeted). Relative to other quadrants, incoming management would least likely be able to increase firm value through hedging for firms in this quadrant. Firms in the two quadrants in the top row, which represents greater derivative use, are both significantly less likely to experience a takeover compared to firms in the bottom two quadrants that exhibit a much lower degree of derivative use. Among these high-derivative use firms there is no significant difference in the fraction of firms targeted. Firms exhibiting the largest decreases in risk and the smallest change in derivatives use firms may be targeted for other reasons (15.5 percent targeted). For example, these firms may be attractive for those seeking to increase the firm's leverage due to the decline in riskiness and apparent lower use of derivatives.

The p-values given are a test of the difference in the proportions of firms targeted between the rows and columns. Table VI illustrates the data in two ways, where the proportions

are highlighted that go with the respective p-values listed. As expected, the proportion of firms targeted (19.6 percent) is statistically highest in the quadrant that provides incoming management with the greatest opportunity to create value by reducing firm-specific risk through proper hedging.[3] Furthermore, we find that lowest takeover frequencies occur in firms with the higher level of derivative usage. As reported in the columns surrounded in red, fewer takeover attempts occur, whether change in risk is high or low, when derivative use increases. This is consistent with our findings in Table III and further suggests that managers' use of derivative instruments can success. These results suggest that the use of derivatives, in addition to deterring takeover, or perhaps because of it, can affect firm value. For example, firms in the top left quadrant make great use of derivatives and yet their firm risk is increasing. This suggests that firm managers are either (a) of poor quality and should be replace or are (b) using hedging for speculative purposes and perhaps to intentionally deter unwanted takeovers and thereby further entrenching themselves. In either case, the managers are destroying value for shareholders. They are either poorly skilled or they are entrenched. To examine this further, we compute the mean firm Tobin's Q for each quadrant. We report these results in Panel B. Indeed, firms in the top left quadrant (high derivative use and high firm risk) exhibit significantly lower value. Interestingly, the firms with the highest mean Tobin's Q are in the top right quadrant (high derivative use and lower firm risk), which contains firms that are most likely using derivatives correctly for hedging purposes and thus increasing firm value. Finally, it is also possible that undervalued firms are attractive to potential purchasers. If undervalued firms are driving results in Table VI (separate from derivative strategy), we would expect to observe the lowest values of Tobin's Q within the

[3] Similar patterns exist when measuring the change in derivative use as the absolute value of the change in the derivatives unrealized gains and losses.

quadrant where the highest percentage of firms are targeted. We fail to observe such a pattern, which suggests this is not driving our takeover results.

Insert Table VI

Though not reported here, we also separated firms based upon the change in total risk as opposed to idiosyncratic risk. The sign and significance of proportional differences are similar with the following exception. The difference between increases and decreases in total risk for the largest changes in derivatives measure is 4.4 percent ($p<0.01$) compared with 1.4 percent ($p=0.341$) for idiosyncratic risk. We also separated firms based on the change in systematic risk. Not surprisingly, there were no significant differences noted between the increasing and decreasing risk columns for either derivative position as firms are unlikely to hedge systematic risk. However, we continue to note statistically lower likelihood of being targeted for firms with increased derivatives use for both increases and decreases in systematic risk. Thus, regardless of how risk is measured, higher changes in derivatives use result in lower likelihood of being targeted.

For both pre- and post-crisis, when idiosyncratic risk is increasing, a lower proportion of firms are targeted when they have the largest change in derivative use ($p<0.01$). This difference, however, is the only significantly different paired comparison post-crisis—the other three are insignificant. Pre-crisis, when the change in derivatives is smallest, there is a mildly significant higher proportion of targeted firms with increasing idiosyncratic risk ($p<0.10$). Thus, regardless of which period idiosyncratic risk is measured, larger changes in derivatives use results in a lower likelihood of being targeted when idiosyncratic risk is high.

7.0 Sensitivity Analysis

Results above are consistent with derivatives being used as a tool to prevent being targeted. However, it is possible that other contemporaneously determined factors impact the market for corporate control. As such, we conduct a matched-sample analysis to examine the association deeper. Rather than match on the outcome variable (being targeted), researchers suggest a superior econometric approach would be to match on the variable of interest (derivatives usage) and then examine differences in the frequency of being targeted (Armstrong, Jagolinzer and Larcker 2010, Armstrong, Larcker, Ormazabal and Taylor 2013; Jayaraman and Milbourn 2015).

As such, we follow Armstrong, Larcker, Ormazabal and Taylor (2013) and Jayaraman and Milbourn (2015) and estimate a propensity score model for the probability that the company has high derivatives usage[4] (using the median as the cutoff), conditional on factors that contribute to derivatives use (independent variables from Table IV). We then identify matched pairs with the smallest propensity score differences and identify the "treatment" firm as the firm with the higher observed derivatives use; the "control" firm is firm with the lower observed derivatives use. First, in Panel A of Table VII, we examine the covariate balance by examining the means and medians of the variables used to estimate the propensity score. Only one of the variables used in the propensity demonstrates a marginal significant difference in mean or median (*Leverage,* p=0.083), while the remaining differences are not significant. We also note a significant difference in derivatives use (p-value=0.000). Thus, we have matched pairs with the closest likelihood to have high derivatives use while demonstrating a significant difference in the actual observed derivatives use. In this manner, Armstrong, Larcker, Ormazabal and Taylor

[4] Consistent with Table IV, derivatives use is defined as the absolute value of the unrealized gain/loss on derivative transactions.

(2013) note this suggests that any variation in being targeted is likely attributable to differences in derivatives use rather than differences in other firm characteristics.

In Panel B of Table VIII, we examine the difference in the probability of being targeted between the high- and low-derivative use firms. The average low-derivative use firm is targeted approximately eighteen percent less often than a similar firm that has high-derivative use (0.13 compared to 0.11, p-value=0.002). In untabulated results, we repeat this analysis using the realized gain/loss from derivatives transactions included in comprehensive income as the measure of derivatives use instead of the unrealized gain/loss. Results are quantitatively and qualitatively similar. The average low-derivative use firm is targeted approximately twenty-seven percent less often than a similar firm that has high-derivative use (0.14 compared to 0.11, p-value=0.000). These matched-pair results confirm the association between the use of derivatives and the market for corporate control.

In untabulated analysis, we also performed a different econometric approach. We matched a targeted firm to a control firm based on several covariates. The resulting matched pairs demonstrated no statistical difference among the covariates. Using a dichotomous variable for the treatment and control firms as the dependent variable and the independent variables from Table III, we estimate a conditional logistic regression, which accounts for the fact that the pairs were matched on the dependent variable. Results are quantitatively and qualitatively similar to Table III. It is informative that results are not sensitive to the econometric matching method used.

Insert Table VII

8.0 Conclusion

Unrealized derivatives gains or losses are often small relative to total firm sales, however, they can often only be the tip of a very large "iceberg." The notional amount outstanding of a firm's derivatives positions, in addition to having the potential to be extremely large, is very difficult to understand and value. This large hidden value creates an advantage for incumbent managers and represents an important type of manager-specific investment that can create job security for the current managers. The market for corporate control is an important governance mechanism that serves to constrain managerial entrenchment by providing a threat of removal. When managers enter in large derivatives positions, however, it can dramatically increase the uncertainty and cost incurred by another firm considering acquiring it. If the acquiring managers are uncertain about the value of the derivatives positions they are less likely to make an acquisition attempt.

Consistent with this conjecture, we find that large unrealized derivatives gains are associated with a significantly lower likelihood of the firm being the target of an acquisition. We also conduct further tests to determine whether the reduced likelihood of being a target is due to the target firms' managers being more skilled or if it is more consistent with entrenchment. After all, large unrealized gains could be due to prudent derivatives trading, which reflect greater managerial skill. We find two pieces of evidence that is supportive of the entrenchment explanation rather than higher managerial skill. Specifically, we find that firms with higher derivatives positions are associated with lower levels of board independence, which suggests weaker internal monitoring. We also find evidence of a negative association between a firm's unrealized derivatives gains and firm value as measured by Tobin's Q. Both of these negative associations suggest that, on average, greater derivative use is an example of an important type

of manager-specific investment that can be effective in entrenching managers. Finally, we document that firms with increasing absolute value of derivatives realized gains and losses are much less likely to be a takeover target. Conversely, when firms exhibit decreasing derivative usage, but increasing risk, which suggest ineffective use of derivatives for hedging they are more likely to be the target of an acquisition. In summary, our findings reveal that corporate derivative use can reveal important insights for shareholders into managerial incentives and skills.

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Table I. Summary Statistics

This table reports descriptive statistics for the sample firms, excluding financial firms. The sample period is from years 2001 to 2006. Derivatives Unrealized is the balance sheet item, Compustat item AOCIDERGL – accumulated other comprehensive income – derivatives unrealized gains/loss. Derivative Gains/Loss is the income statement item, Compustat item CIDERGL – comprehensive income – derivatives gains/losses. Both are in $millions. Firm total sales, total assets, research and development expenditures (R&D) and the number of business segments are from Compustat. Firm Age is determined from the first year the firm occurs in the CRSP database. Volatility is the past standard deviation of the prior thirty-six monthly stock returns, which are obtained from CRSP. All board data are from Risk Metrics database. Board size is the number of directors on the board. Percent Independent is the percentage of board members who are not employees of the firm or related to firm managers and have no affiliation with the firm. Busy Board is an indicator variable that equals one if more than 50% of the independent directors on the board have 3 or more directorships. CEO Chair is an indicator that equals one if the CEO is also the chairman of the board and zero otherwise. ROA is EBITDA scaled by total assets. Q is the market to book approximation of Tobin's Q, which is measured as total book assets minus book equity plus the market value of equity all scaled by total book assets. T-test is used to test for difference in the means and the difference in medians are tested using the Wilcoxon (1945) signed rank test.

	All Firms			No Derivatives			Derivatives			Difference			
Firm Characteristics	N	Mean	Median	N	Mean	Median	N	Mean	Median	Mean		Median	
Derivatives Unrealized	17,347	-5.076	0.000	9,548	0.000	0.000	7,799	-11.289	-0.719				
Derivative Gains/Loss	13,399	0.030	0.000	7,286	0.000	0.000	6,113	0.036	0.023				
Derivatives Unrealized / Sales	17,347	-0.001	0.000	9,548	0.000	0.000	7,799	-0.001	0.000				
Derivative Gains/Loss / Sales	13,399	0.000	0.000	7,286	0.000	0.000	6,113	0.000	0.000				
Assets	17,347	7,073.987	1,495.370	9,548	3,235.370	798.229	7,799	11,773.450	3,160.926	-8,538.080	***	-2,362.698	***
Sales	17,347	6,002.099	1,389.530	9,548	3,429.830	802.916	7,799	9,151.224	2,761.000	-5,721.394	***	-1,958.085	***
R&D/Assets	17,347	0.034	0.002	9,548	0.042	0.002	7,799	0.023	0.002	0.020	***	0.000	***
Firm Age	17,347	24.823	19.000	9,548	20.838	17.000	7,799	29.701	24.000	-8.863	***	-7.000	***
Number of Business Segments	14,583	2.718	2.000	7,721	2.443	1.000	6,862	3.029	3.000	-0.586	***	-2.000	***
Volatility	17,076	0.123	0.107	9,366	0.136	0.119	7,710	0.107	0.095	0.029	***	0.024	***
Board Size	14,583	9.050	9.000	7,721	8.453	8.000	6,862	9.725	10.000	-1.272	***	-2.000	***
Percent Independent	14,583	75.406	77.778	7,721	73.654	75.000	6,862	77.386	80.000	-3.732	***	-5.000	***
Busy Board	14,583	0.052	0.000	7,721	0.040	0.000	6,862	0.066	0.000	-0.026	***	0.000	***
CEO Chair	14,583	0.549	1.000	7,721	0.508	1.000	6,862	0.595	1.000	-0.087	***	0.000	***
ROA	17,347	0.143	0.136	9,548	0.135	0.133	7,799	0.152	0.138	-0.016		-0.006	***
Q	17,313	1.979	1.601	9,529	2.110	1.680	7,784	1.818	1.525	0.292	***	0.155	***

*** p<0.01, ** p<0.05, * p<0.1

Table II. Fama-French 10 Industry Mean and Total Derivatives Unrealized

This table reports the mean and total derivatives unrealized for each of the 10 Fama-French defined industry definitions for firms reporting derivative gains or losses. Financial firms are included in industry 10.

Fama French 10 Industry Definitions	Mean Derivatives Unrealized	Total Derivatives Unrealized
1. Consumer NonDurables -- Food Tobacco, Textiles, Apparel, Leather, Toys	-3.761	-4,062.134
2. Consumer Durable -- Cars, TVs, Furniture, Household Appliances	3.769	1,749.032
3. Manufacturing -- Machinery, Trucks, Planes, Chemicals, Off. Furniture, Paper	-10.543	-29,140.930
4. Energy, Oil, Gas, and Coal Extraction and Products	-11.750	-9,023.965
5. HiTech Business Equipment -- Computers, Software, and Electronic Equipment	-1.119	-3,544.281
6. Telephone and Television Transmission	-9.375	-2,624.953
7. Wholesale, Retail, and Some Services (Laundries, Repair Shops)	0.182	375.186
8. Healthcare, Medical Equipment, and Drugs	-6.090	-8,489.281
9. Utilities	-27.112	-11,386.990
10. Other -- Mines, Contr. Bld Mt., Trans., Hotels, Bus. Serv., Entertainment, Finance	-11.836	-22,642.070

Table III. Acquisition Target

This table reports results of logit regressions on the likelihood of the firm being a target of an acquisition attempt during the sample period. The dependent variable in models 1 through 3 equals one if the firm is the target of an acquisition attempt during the year. Model 4 examines the subsample of firms that are the target of an acquisition attempt and the dependent variable equals one if the acquisition attempt was withdrawn and zero otherwise. Derivatives Unrealized Gains (Losses)/Sales is industry adjusted based on the median value for the Fama-French 49 Industry. FD indicates the first-difference of the variable. Annual stock return is the monthly compounded return for the fiscal year from CRSP. Leverage is the book value of long-term debt plus current liabilities scaled by total book assets from Compustat. Cash holdings is cash plus marketable securities scaled by total assets. CEO ownership is the percentage of shares outstanding held by the CEO from Execucomp. Industry M&A Activity is the number of mergers or acquisitions in the Fama-French 49 industry classification industry. All M&A data are from Thomson's SDC database. Financial firms are excluded. All models incorporate robust standard errors and firm clustering. The corresponding *p*-values are reported beneath each coefficient estimate.

Panel A

VARIABLES	(1) Target	(2) Target	(3) Target	(4) Withdrawn
Der. Unrealized Gains (Losses)/Sales	-4.138*			17.239***
	(0.057)			(0.007)
FD Der. Unrealized Gains (Losses)/Sales		-3.219**		
		(0.018)		
Der. Realized Gain (Loss)/Sales			-3.365**	
			(0.023)	
Derivative Expert				-0.417*
				(0.055)
Ln(Assets)	0.167***	0.164***	0.175***	0.011
	(0.000)	(0.000)	(0.000)	(0.856)
Annual Stock Return	-0.173**	-0.152*	-0.135	0.126
	(0.022)	(0.062)	(0.152)	(0.483)
Annual Stock Return(t-1)	-0.002	-0.007	-0.008	0.124
	(0.959)	(0.877)	(0.868)	(0.693)
Leverage	-0.470***	-0.448***	-0.371**	-0.739
	(0.004)	(0.006)	(0.024)	(0.128)
Cash Holdings	0.480**	0.449**	0.545***	1.431*
	(0.011)	(0.020)	(0.006)	(0.063)
ROA	2.552***	2.484***	2.088***	-0.163
	(0.000)	(0.000)	(0.000)	(0.918)
ROA(t-1)	-0.078	-0.050	-0.056	0.004
	(0.763)	(0.860)	(0.848)	(0.998)
CEO Ownership	-0.008	-0.008	-0.006	-0.013
	(0.142)	(0.151)	(0.297)	(0.445)
Industry M&A Activity	0.005***	0.005***	0.006***	0.005
	(0.000)	(0.000)	(0.000)	(0.380)
Constant	-4.299***	-4.200***	-3.560***	-4.330***
	(0.000)	(0.000)	(0.000)	(0.001)
Observations	17,347	16,095	13,722	2,238
Pseudo R-squared	0.0525	0.0468	0.0364	0.109

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table III. Acquisition Target

Panel B

VARIABLES	(1) Target	(2) Target	(3) Target	(4) Withdrawn
Der. Unrealized Gains (Losses)/Sales	-4.904**			37.967***
	(0.031)			(0.009)
FD Der. Unrealized Gains (Losses)/Sales		-2.718**		
		(0.026)		
Der. Realized Gain (Loss)/Sales			-2.643**	
			(0.044)	
Ln(Assets)	0.174***	0.173***	0.187***	-0.047
	(0.000)	(0.000)	(0.000)	(0.532)
Annual Stock Return	-0.278***	-0.285***	-0.298***	0.146
	(0.000)	(0.000)	(0.000)	(0.752)
Annual Stock Return(t-1)	-0.027	-0.018	-0.008	0.163
	(0.652)	(0.794)	(0.921)	(0.720)
Leverage	-0.283	-0.250	-0.145	-0.432
	(0.136)	(0.196)	(0.462)	(0.497)
Cash Holdings	0.374*	0.347	0.475**	-1.343
	(0.082)	(0.115)	(0.037)	(0.119)
ROA	3.159***	3.182***	2.820***	-0.581
	(0.000)	(0.000)	(0.000)	(0.783)
ROA(t-1)	-0.421	-0.489	-0.609	-0.280
	(0.232)	(0.189)	(0.123)	(0.907)
CEO Ownership	-0.010	-0.010	-0.007	-0.008
	(0.167)	(0.172)	(0.322)	(0.676)
Industry M&A Activity	0.005***	0.005***	0.005***	0.006
	(0.000)	(0.001)	(0.001)	(0.341)
E-Index	0.021	0.031	0.038	-0.013
	(0.445)	(0.283)	(0.189)	(0.895)
Constant	-4.402***	-4.172***	-3.752***	-3.748***
	(0.000)	(0.000)	(0.000)	(0.009)
Observations	12,997	11,999	10,068	1,764
Pseudo R-squared	0.0528	0.0468	0.0366	0.0931

Robust pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table IV. Determinants of the Size of Derivatives Position

This table reports results of OLS regressions on the absolute value of the industry adjusted unrealized derivatives values scaled by total sales. All models include industry fixed effects. The E-Index is the subset of the Gompers, Ishii and Metrick (2003) G-index that includes six of the strongest anti-takeover provisions as used in Bebchuk, Cohen and Ferrell (2009). All other variables are as described in previous tables. Standard errors are robust and clustered by firm. The corresponding *p*-values are reported beneath each coefficient estimate.

	(1)	(2)
VARIABLES	ABS(Unrealized/Sales)x1000	ABS(GainLoss/Sales)x1000
Ln(Assets)	0.577***	0.376**
	(0.000)	(0.028)
Percent Independent	-0.036**	-0.033*
	(0.020)	(0.071)
Board Size	-0.075	-0.078
	(0.395)	(0.444)
CEO Chair	0.135	0.124
	(0.620)	(0.672)
Leverage	2.940**	1.818*
	(0.023)	(0.057)
Number of Business Segements	-0.185**	-0.292***
	(0.017)	(0.000)
E-Index	0.425**	0.512**
	(0.044)	(0.033)
Constant	-0.865	-1.160
	(0.500)	(0.554)
Observations	13,512	10,447
Adjusted R-squared	0.072	0.091

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table V. Firm Value

This table reports results from OLS regressions using firm fixed effects of the natural logarithm of Tobin's Q. FD denotes first difference. Outside Director Ownership is the percentage of shares outstanding held by all of the non-employee directors on the board. Founding Family Present is an indicator variable that equals one if a founding family member is present on the board. Operating Cash Flow and Capital Expenditures are from Compustat. All other variables are as described in prior Tables. All models incorporate robust standard errors. The corresponding *p*-values are reported beneath each coefficient estimate.

VARIABLES	(1) Ln(Q)	(2) Ln(Q)	(3) Ln(Q)	(4) Ln(Q)
Der. Unrealized Gains (Losses)/Sales	-0.495**			
	(0.036)			
FD Der. Unrealized Gains (Losses)/Sales		-0.286		
		(0.203)		
Der. Realized Gain (Loss)/Sales			-0.227	
			(0.338)	
FD Der. Realized Gain (Loss)/Sales				-0.234*
				(0.089)
Percent Independent	-0.000	-0.000	-0.001**	-0.000
	(0.232)	(0.777)	(0.037)	(0.435)
Outside Director Ownership	-0.003***	-0.003***	-0.003***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
CEO Ownership	-0.002	-0.002*	-0.001	-0.001
	(0.122)	(0.095)	(0.529)	(0.405)
CEO Ownership2	0.000	0.000	0.000	0.000
	(0.785)	(0.546)	(0.855)	(0.438)
Operating Cash Flow/Assets	1.201***	1.156***	1.159***	1.064***
	(0.000)	(0.000)	(0.000)	(0.000)
Capital Expenditure/Sales	0.077**	0.063	0.084**	0.077*
	(0.049)	(0.114)	(0.030)	(0.076)
R&D/Assets	0.706***	0.760***	0.862***	0.822**
	(0.005)	(0.004)	(0.008)	(0.020)
Ln(Assets)	-0.098***	-0.088***	-0.095***	-0.077***
	(0.000)	(0.000)	(0.000)	(0.000)
Ln(Firm Age)	-0.026**	-0.013	-0.056***	-0.024
	(0.011)	(0.239)	(0.000)	(0.140)
Number of Business Segements	-0.023***	-0.023***	-0.023***	-0.023***
	(0.000)	(0.000)	(0.000)	(0.000)
Constant	1.325***	1.189***	1.445***	1.179***
	(0.000)	(0.000)	(0.000)	(0.000)
Observations	12,219	10,934	9,126	7,851
Adjusted R-squared	0.723	0.732	0.746	0.754

Robust pval in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VI. Change in Derivatives Exposure and Idiosyncratic Risk and the Likelihood of being an Acquisition Target.

This table reports results of differences in the proportion of firms that were targeted. All firm-years were split into terciles by the change in idiosyncratic risk and absolute value of the change in derivative realized gain/(loss) scaled by total sales. The middle terciles were eliminated and remaining observations placed into quadrants based on increasing and decreasing idiosyncratic risk and derivative gains(losses). The corresponding *p*-values are reported for the difference in the proportion of firms that were targeted across quadrants.

Panel A: Proportion of Firms Targeted

		Δ Idiosyncratic Risk			
		High	Low	Difference	
ABS(Δ Der. Realized Gain (Loss)/Sales)	High	0.136	0.122	0.014	p=0.341
	Low	0.196	0.155	0.040**	p=0.024
	Difference	-0.059***	-0.033**		
		p=0.000	p=0.047		

Panel B: Tobins Q

		Δ Idiosyncratic Risk			
		High	Low	Difference	
ABS(Δ Der. Realized Gain (Loss)/Sales)	High	1.594	1.759	-0.165***	p=0.000
	Low	1.699	1.669	0.030	p=0.538
	Difference	-0.105**	0.090*		
		p=0.011	p=0.075		

Table VII. Acquisition Target – Matched Sample

This table reports results from a matched-pair design. Matches are identified according to the likelihood of having high derivative use by minimizing the difference in propensity score based on several control variables. Within each matched pair, treatment firms are those with higher derivative use while control firms are those with lower derivative use. Panel A presents the covariate balance between the matched pairs. Panel B presents a comparison of the proportion of the firms that were the target of an acquisition.

Panel A

	Treatment Sample		Control Sample		Difference	
Covariates	Mean	Median	Mean	Median	Mean	Median
Ln(Assets)	7.619	7.485	7.600	7.458	0.019	0.027
Percent Independent	75.609	77.778	75.324	77.778	0.284	0.000
Board Size	9.107	9.000	9.065	9.000	0.043	0.000
CEO Chair	0.546	1.000	0.554	1.000	-0.008	0.000
Leverage	0.313	0.308	0.319	0.307	-0.006*	0.001
Number of Business Segements	2.756	2.000	2.709	2.000	0.048	0.000
E-Index	3.233	3.000	3.240	3.000	-0.006	0.000

*** p<0.01, ** p<0.05, * p<0.1

Panel B

	Proportion of Firms Targeted
Low Derivative Use	0.13
High Derivative Use	0.11
Difference	0.02***
P-Value	(0.002)